Claims

What is claimed is:

[c1] A method of making fused silica, comprising:

generating a plasma;

delivering reactants comprising a silica precursor into the plasma to produce silica particles; and

depositing the silica particles on a deposition surface to form glass.

[c2] The method of claim **1**, wherein delivering reactants comprising a silica precursor into the flame further comprises delivering a dopant material into the plasma to form doped silica particles.

[c3] The method of claim **2**, wherein the dopant material comprises a compound capable of being converted to an oxide of at least one member of the group consisting of B, Al, Ge, K, Ca, Sn, Ti, P, Se, Er, and S.

[c4] The method of claim **2**, wherein the dopant material comprises a fluorine compound.

[c5] The method of claim **4**, wherein the fluorine compound is selected from the group consisting of CF_4, CF_xCl_{4-x}, where x ranges from 1 to 3, NF_3, SF_6, SiF_4, C_2F_6, and F_2.

[c6] The method of claim **1**, wherein the plasma is generated by induction with a high frequency generator.

[c7] The method of claim **1**, wherein the silica precursor is substantially free of hydrogen.

[c8] The method of claim **7**, wherein the silica precursor comprises $SiCl_4$.

[c9] The method of claim **1**, wherein the glass is formed in an enclosure having a water vapor content less than 1 ppm by volume.

[c10] A method of making fluorine-doped glass, comprising:

generating a plasma;

delivering reactants comprising a silica precursor and a fluorine compound into the plasma to form fluorine-doped silica particles; and

depositing the fluorine-doped silica particles on a deposition surface to form glass.

[c11] The method of claim **10**, wherein the silica precursor and fluorine compound are delivered into the plasma in gaseous form.

[c12] The method of claim **10**, wherein the silica precursor is substantially free of hydrogen.

[c13] The method of claim **12**, wherein the silica precursor comprises $SiCl_4$.

[c14] The method of claim **10**, wherein the fluorine compound is selected from the group consisting of CF_4, CF_xCl_{4-x}, where x ranges from 1 to 3, NF_3, SF_6, SiF_4, C_2F_6, and F_2.

[c15] The method of claim **10**, wherein the glass is formed in an enclosure having a water vapor content less than 1 ppm by volume.

[c16] A photomask material produced by a method comprising:

generating a plasma;

delivering reactants comprising a silica precursor into the plasma to form silica particles; and

depositing the silica particles on a deposition surface to form glass.

[c17] The photomask material of claim **16**, wherein the silica precursor is substantially free of hydrogen.

[c18] The photomask material of claim **17**, wherein the silica precursor comprises $SiCl_4$.

[c19] The photomask material of claim **16**, wherein the glass is formed in an enclosure having a water vapor content less than 1 ppm by volume.

[c20] The photomask material of claim **16**, further comprising delivering a dopant material into the plasma to form doped silica particles.

[c21] The photomask material of claim **20**, wherein the dopant material comprises a fluorine compound.

[c22] The photomask material of claim **21**, wherein the fluorine compound is selected from the group consisting of CF_4, CF_xCl_{4-x}, where x ranges from 1 to 3, NF_3, SF_6, SiF_4, C_2F_6, and F_2.

[c23] A photomask for use at 157-nm comprising a silica glass made by plasma induction.